

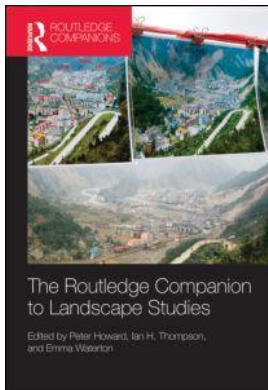
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# (Re)creating wilderness: rewilding and habitat restoration

Steve Carver

UNIVERSITY OF LEEDS

In wildness is the preservation of the world

(Thoreau, 1979 [1862])

It is 150 years since Henry Thoreau penned these words, words that resonate perfectly with our time. Despite a broader awareness of environmental issues and the threat to society posed by climate change, we ride roughshod over the planet's last remaining wildernesses. Rainforests continue to be logged, the Arctic tapped for its fossil fuel reserves, the deserts mined for their mineral wealth and the oceans overfished. All of this is being driven by population growth and the wholly understandable desire for a better life. Malthus, Hardin and the Club of Rome aside, it seems that there might be no place for wildness in the landscapes of tomorrow where every little bit of the Earth will be settled, farmed, logged, fished, mined or otherwise exploited for human benefit. While such a world might *just* be sustainable, it will be poorer for it and highly susceptible to external forces of climate change and natural disasters, as well as those of our own making such as economic boom–bust cycles and war. A better vision of the landscapes of the future is that which is based around a much closer relationship between humans and nature, one that is mutually beneficial and one where, as Thoreau's dictum suggests, life depends on the continued existence of wild places and the buffer they provide against the worst excesses of man and nature.

The human relationship with nature and landscape is a long one. It has shaped who we are as a species and we in turn have shaped it. This is well expressed in Cicero's *De natura deorum* where he talks about second nature as the bountification of wilderness: 'We sow corn, we plant trees, we fertilize the soil by irrigation, we dam the rivers and direct them where we want. In short, by means of our hands we try to create as it were a second nature within the natural world' (Cicero, trans. Hunt, 1996). By implication, first nature is wilderness, the jumble of stuff from which landscapes are made, while the building blocks of the planet, including the geosphere, hydrosphere, cryosphere, biosphere and atmosphere, have been called zero nature especially in the work of Charles Jencks on contemporary garden design (Spens, 2004). Third nature is often taken to refer to the development of a designed aesthetic, usually expressed through formal/informal gardens, landscape architecture, the arts and the appreciation of wild nature that evolved during the Romantic movement of the mid-nineteenth century, of

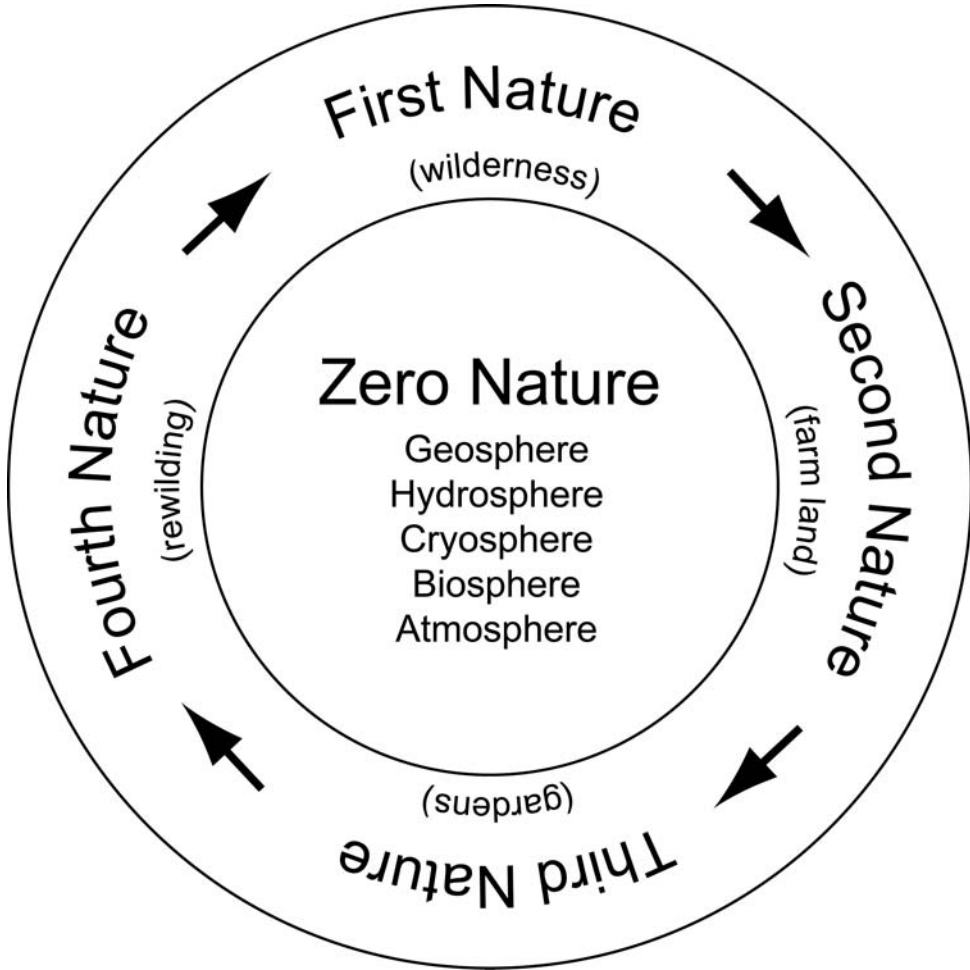


Figure 32.1 The cycle of nature-culture.

which Thoreau was of course a part (Castree, 2005; Whatmore, 2005). Today, we are seeing something of a shift in the nature paradigm towards a fourth nature based around the (re)creation of wildness through the process of ecological restoration or (re)wilding. While this does not entirely abandon the values and ideas of second and third nature, it does seek to redress the balance and bring us back full circle to first nature (wilderness) by reducing the human influence within selected landscapes, and in some cases removing it altogether, such that the primary dynamic is that of natural processes leading to natural form and function (see Figure 32.1). Part of this new movement is founded around the understanding that human survival is predicated on the existence of functional natural systems that provide us with ecosystem goods and services. De Groot et al. (2002) categorised these into provisioning, regulating, supporting and cultural services. The first three categories provide goods and services such as timber and fresh water, regulate processes such as flooding and carbon sequestration, and support a functioning planet through crucial systems such as the carbon and hydrological cycles. The fourth links back to our place as human beings within, and to our appreciation of, landscapes through cultural services such as the provision of high quality recreational environments and spaces in which to

appreciate and experience wild nature. The concept of ecosystem goods and services is currently very much in vogue among the conservation industry as a means of justifying their own existence, as well as their actions and policies. Landscapes that have previously been conserved and protected on purely aesthetic and wildlife grounds now have added economic value as providers of essential life-maintaining services such as water supply and flood water retention. Of course, this has long been known among landscape ecologists who always understood the connection between landscapes and the range of services they provide. This perhaps is best summed up in a quote from John Muir, founding father of the US National Park system, where he proclaims

Thousands of tired, nerve-shaken, over-civilised people are beginning to find out that going to the mountain is going home; that wildness is necessity; that mountain parks and reservations are useful not only as fountains of timber and irrigating rivers, but as fountains of life.

(Muir, 1901)

Some fifty odd years later, Aldo Leopold (1949), in his influential collection of essays *A Sand County Almanac*, suggests that the first rule of intelligent tinkering is to keep all the parts. Since the establishment of the world's first national parks, conservation has largely focused on doing just this ... protecting nature and ecosystems within the confines of relatively small areas of land set aside to protect them from the worst impacts of human activity. Some of the earliest known protected areas were forest reserves, or Rāhui, created by the Māori in New Zealand in a vain attempt to protect the huge flightless Moa bird from over-hunting and extinction. Many other species have since gone the way of the Moa, largely due to over-exploitation and destruction of their habitat by forestry, agriculture, extractive industries and urban expansion. Such habitat loss results in fragmentation and leads to the unsustainability of the remaining areas because of the lack of interactions with other populations, limited gene pool and the physical restrictions on natural processes. Without connectivity of natural habitat, these smaller isolated pockets of wild land are in danger of falling into irreversible decline without active and expensive human intervention. Although Leopold is correct in his assertion that we must keep all the component parts of the world's many and varied natural ecosystems, keeping them *connected* and in the correct *order* is the key to a fully functioning and resilient system and likely to be our greatest challenge over the coming years. This brings us to the second paradigm shift in modern landscape conservation, that of connectivity management (Worboys et al., 2010). Here the global conservation community is lobbying hard to get governments to think at the landscape scale and support large scale habitat restoration through the creation of transnational habitat networks based around the cores, corridors and carnivores model (see Figure 32.2). This recognises that protected areas (cores) can be reconnected utilising a system of protected wildlife corridors and stepping stones (smaller refugia between larger protected areas) that act as conduits for the movement of species. Where physical corridors are not possible, wildlife-friendly land management practices can be used to create landscapes that are more permeable to wildlife movements. The top predators in an ecosystem are often cited as barometers of general ecosystem health, so if large carnivores are present in sufficient number and in good condition and, critically, they are able to move freely across the landscape and between cores utilising these corridors and stepping stones, then this is indicative that the rest of the ecosystem must be in good health.

Here we look further at some of these developing trends and paradigms in nature conservation, see how they relate to landscape studies and how, ultimately, they may change the human-nature relationship in the medium to longer term.

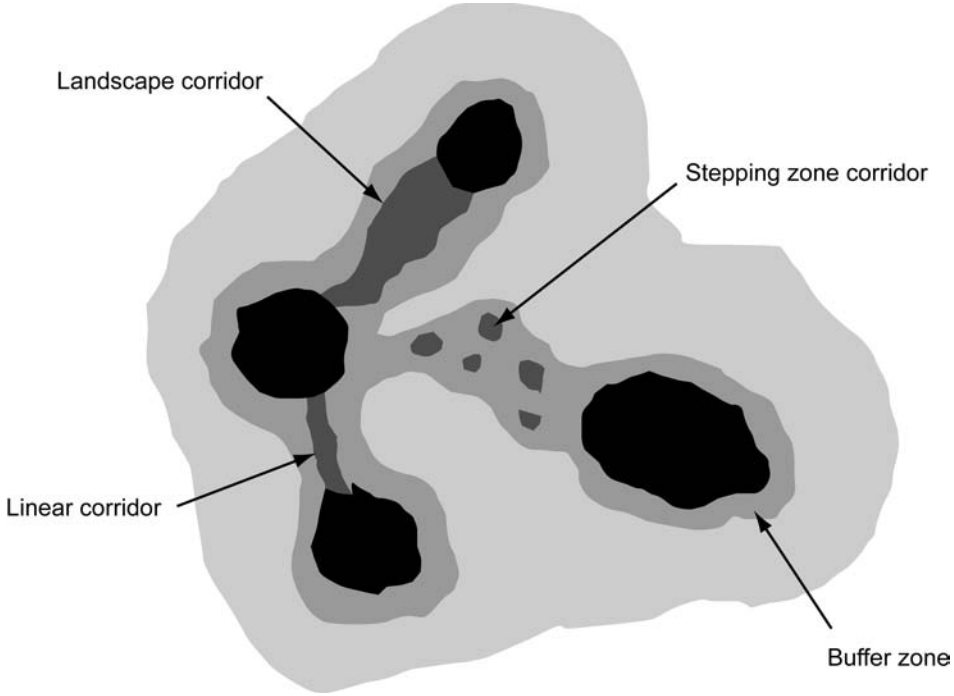


Figure 32.2 Cores and corridors connectivity (after Worboys et al., 2010).

### Giving back the land

Google the term ‘rewilding’ and you’ll get multiple hits, many linking back to the work of Dave Forman, Michael Soulé and Reed Noss who first coined the term and its meaning within conservation biology: to return a landscape to a natural state, often at a large scale involving restoring wilderness conditions to core areas, connecting these with wildlife-friendly corridors and reinstating lost keystone species (Soulé and Noss, 1998; Foreman, 2004). Essentially, rewilding is about giving back the land to a state of nature after possibly millennia of human control and modification. Vegetation patterns will have been massively changed through forest clearance, agriculture and urbanisation, keystone species will have been extirpated (often deliberately and usually because they were seen as a threat or in competition to human livelihood) and even the shape of the land could have been extensively modified by river canalisation, coastal defence works, mining and quarrying, dam building and other large earthworks. Climatic conditions are likely to have changed as well, and as such ‘rewilding’ is a somewhat misleading term in that returning the landscape to the way it looked before is often a biophysical impossibility. ‘Wilding’ is therefore perhaps a more accurate term and indicates a forward-looking process of moving on to a new state of wild nature. Nevertheless, the (re)wilding process is underpinned by a raft of new scientific developments in the field of ecology and conservation biology including extinction dynamics, island biogeography, metapopulation theory, natural disturbance ecology, top-down regulation by large carnivores, and landscape-scale ecological restoration, all of which come together in (re)wilding to say that without large-scale habitat restoration and joined up natural landscapes, the current human induced extinction event will

continue and the very ecosystem services on which we as a species depend will be under threat of collapse.

While the model of cores, corridors and carnivores outlined in Figure 32.2 is the backbone of (re)wilding at the whole landscape scale, exactly how it is achieved can vary. Two basic approaches are ‘letting go’ and ‘wild by design’ (Council for National Parks, 1998). In the letting-go approach it is maintained that if a landscape is left unmanaged for a long enough period, nature will fill the gap left by removal of human management, take over and produce its own entirely natural landscape. While this may not necessarily be the same landscape that existed before human modification, it will be natural because it will have been shaped entirely by natural processes. The wild by design approach, on the other hand, maintains that we may need to actively ‘design’ wild landscapes by assisting the regeneration of native species and selectively removing human elements to recreate a more natural looking landscape, but one which may still contain limited economic activity in the form of low-intensity grazing and recreation. Both approaches have advantages and disadvantages, most notably there could be problems with ‘unwanted’ or unforeseen outcomes with the letting go approach (e.g. competition by exotic species over native flora and fauna leading to ‘unnatural’ landscape mosaics) and overdesign of presumed natural patterns or desire to maintain some level of management (e.g. through ‘naturalistic’ grazing by semi-domesticated livestock) in the wild by design approach. In practice, complete abandonment of land to natural forces is rare and when it does happen the rewilding is often unintentional such as in disaster zones (e.g. the exclusion zone around Chernobyl) or where a land use is completely withdrawn without replacement (e.g. the European Green Belt of the former east–west military zone from the Cold War Europe and Eastern Bloc military training grounds). In most projects a range of management actions have been adopted to try and arrive at either semi-natural or near-natural landscapes. These include:

- reducing grazing pressure to allow vegetation to develop more naturally;
- restructuring specific landscape elements such as conifer plantations to give a more natural outline;
- complete removal of obtrusive human features or structures such as access tracks, bridges and redundant buildings from the landscape so as to provide a wilder feel to visitors;
- assisted and non-assisted regeneration of native vegetation patterns;
- enhancing and restoring natural features such as river restoration schemes and coastal realignment;
- allowing natural processes to develop landscapes through natural succession and interruption devoid of human control and interference such as in floodplain rewetting schemes;
- reintroduction of native species (and removal of exotics) from plant species up to and including top-level predators.

These may take place over a range of spatial scales from small local sites to whole landscapes spanning entire continents. As a basic rule of thumb, the bigger the better as this allows greater room for natural processes to operate, species to occupy and move about, and mosaics, seres and ecotones to develop. Smaller rewilding projects are still important, but tend to be limited in scope and need to be carefully connected to the broader landscape through corridors and habitat networks. Time is also an important factor as rewilding cannot happen overnight, although given the space and freedom of self-determination it is often surprising how quickly nature can take over (again, the Chernobyl example is apposite here, see Mitsch and Mander, 1997). In general, rewilding represents a long term commitment to removing human influence

and control for time scales spanning not just tens but hundreds of years, indeed many rewilding projects do not have end dates, rather open-ended, long-term objectives.

Whatever the scale and how ever the rewilding is carried out, the intention is usually to create landscapes that are self-willed, that are masters of their own destinies and subject only to the ecological rules governing succession and interruption, competition, symbiosis and biocenosis. Outside of wilderness areas such landscapes are few and far between, and where they do exist they do so largely by some accident of fate. As such, the few rewilding projects that exist are important demonstrators for what the landscapes of tomorrow could and should look like.

The justifications for rewilding are perhaps as wide and varied as its theoretical and practical underpinnings. We might broadly classify these under two headings: anthropocentric and biocentric. Anthropocentric arguments in support of rewilding take the ‘what’s in it for us’ viewpoint by stressing the benefits accruing to us as humans, be they economic through direct or indirect support of local economies and livelihoods, or environmental in terms of ecosystem goods and services provided as part of the wild or rewilded commons. A coherent argument in favour of rewilding can be made around a simple cost–benefit analysis. In marginal lands the economic subsidies from the government (paid for by taxpayer contributions) to support local agricultural production can mean that the real price of produce is far higher than its market value. Of course there are social arguments for helping maintain local economies, traditional agricultural practice and the landscapes they have created, but the wider costs may far outweigh the local benefits. From this wider spatial perspective, it may make more sense to divert the subsidies from unprofitable agriculture into land stewardship schemes based on rewilding wherein far greater benefits are accrued from the improved package of ecosystem services such as improvements in water quality (less treatment costs), better water retention (less downstream flooding and greater groundwater recharge), maintenance of carbon stores and increased carbon sequestration through reduced soil/peat erosion, restoration of bog/mire and woodland communities, improvements in nutrient cycling, better wildlife habitats, more aesthetically pleasing landscapes and increased recreational opportunity (greater tourism potential and healthier population) and so on.

The biocentric arguments in favour of rewilding stem largely from Leopold’s Land Ethic that ‘enlarges the boundaries of the (social) community to include soils, waters, plants, and animals, or collectively: the land’ (Leopold, 1949: 204). Here, Leopold rails against the worst excesses of land ownership: ‘To sum up: we asked the farmer to do what he conveniently could to save his soil, and he has done just that and only that. The farmer who clears the woods off a 75 percent slope, turns his cows into the clearing, and dumps its rainfall, rocks, and soil into the community creek, is still (if otherwise decent) a respected member of society ... Obligations (to the land) have no meaning without conscience, and the problem we face is the extension of the social conscience from people to land’ (Leopold, 1949: 209). Thus Leopold is saying we owe a duty of care to the land, and there is a strong ethical imperative to put back the wildness we have removed from our countryside, to create the notion of a fourth nature developed here.

Of course, rewilding is not without its problems and there are many detractors, not least from the land owning and farming lobby. The ecosystem services argument is not a popular one in many rural communities since while the benefits accrue to the many (e.g. urban populations living some distance from the point of supply) these are usually at the cost of a few (e.g. local populations whose way of life and livelihoods need to change). Rewilding may also be seen as contrary to the whole idea of second nature, that of making the land fruitful and productive. Thus, land ownership presents something of a barrier to large-scale rewilding, at least where the bulk of the land is in private ownership and where the imperative is to make money. Payment

schemes, tax breaks and other financial incentives together with local business opportunities arising from rewilding schemes could redress the balance. The case with public lands is somewhat different and the opportunities for rewilding are greater with fewer constraints imposed by the money-making imperative, though perhaps there are still more in terms of policy constraints, multiple use and lack of funding. Looking at the bigger picture, rewilding provides opportunities to create landscapes that are more resilient to climate change, so benefiting everyone and everything in the longer term.

## Lessons from around the world

Having outlined the theory and practice behind rewilding, it is perhaps useful at this point to look at a few international examples where large-scale rewilding has gained widespread acceptance and several networks are in existence. The work of the Wildlands Network and the Rewilding Institute in North America has been instrumental in developing the scientific thinking behind continental-scale rewilding networks. Examples include Y2Y linking the Yellowstone and Yukon ecosystems along the Rocky Mountains and the proposed network of multiple Wildways<sup>©</sup> across North America from north to south and east to west being developed by the Wildlands Network. The recent WILD9 conference (9th World Wilderness Congress) in Mexico supported the creation of the Mesoamerican Biodiversity Corridor (CBM) to link North and Central America to help extend these networks south into South America. This is conservation thinking on a very large scale and will ultimately allow wildlife to travel the distances required to find a mate, to breed and to keep genetic variability strong. They will be constructed using the cores, corridors and carnivores model to connect public and private lands in such a way as to provide suitable habitat and safe passageways for wildlife to travel freely from place to place. Mixing human and wildlife habitats is a difficult issue and so these corridors will be routed around towns and cities and make extensive use of eco-bridges to span barriers where major roads cross wildlife corridors. All this work will be based on scientific principles using GIS and related mapping methods to identify the best routes.

A similar programme of wildlife cores and corridors is under development in Australia including the 2,800km long A2A (Australian Alps to Atherton) corridor. This is a long-term plan to improve the resilience of Australia's flora and fauna in the face of climate change and human land use pressure, in an extensive area of significant biodiversity (the terrestrial equivalent of the Great Barrier Reef). The Australian government has recently announced AUS \$10 million in funding to help create a National Wildlife Corridor Plan that will link national parks and reserves with well-managed private land and guide future Government investment in projects that support and conserve biodiversity, water resources and build resilience to climate change. Following the North American example, this is an example of conservation thinking on a grand scale.

The Netherlands has an impressive and ongoing plan to create a national ecological network. The Netherlands is one of the most densely populated countries in Europe and this has created the need for a highly planned and managed landscape. Few of us would therefore normally associate Holland with wild nature, yet in between the fields, houses and factories exists a remarkably dense network of national parks, nature reserves and wildlife corridors. The Dutch nature 'planners' are currently engaged in a bold programme of nature creation, the flagship of which is the Oostvaardersplassen in Flevoland. Here, an area of polder of around 5,600 ha, has been developed into a natural wetland landscape of open water, reed beds and grasslands populated by a diverse range of bird life and an introduced population of large herbivores, including Konik ponies, Heck cattle and red deer. There are other such areas within



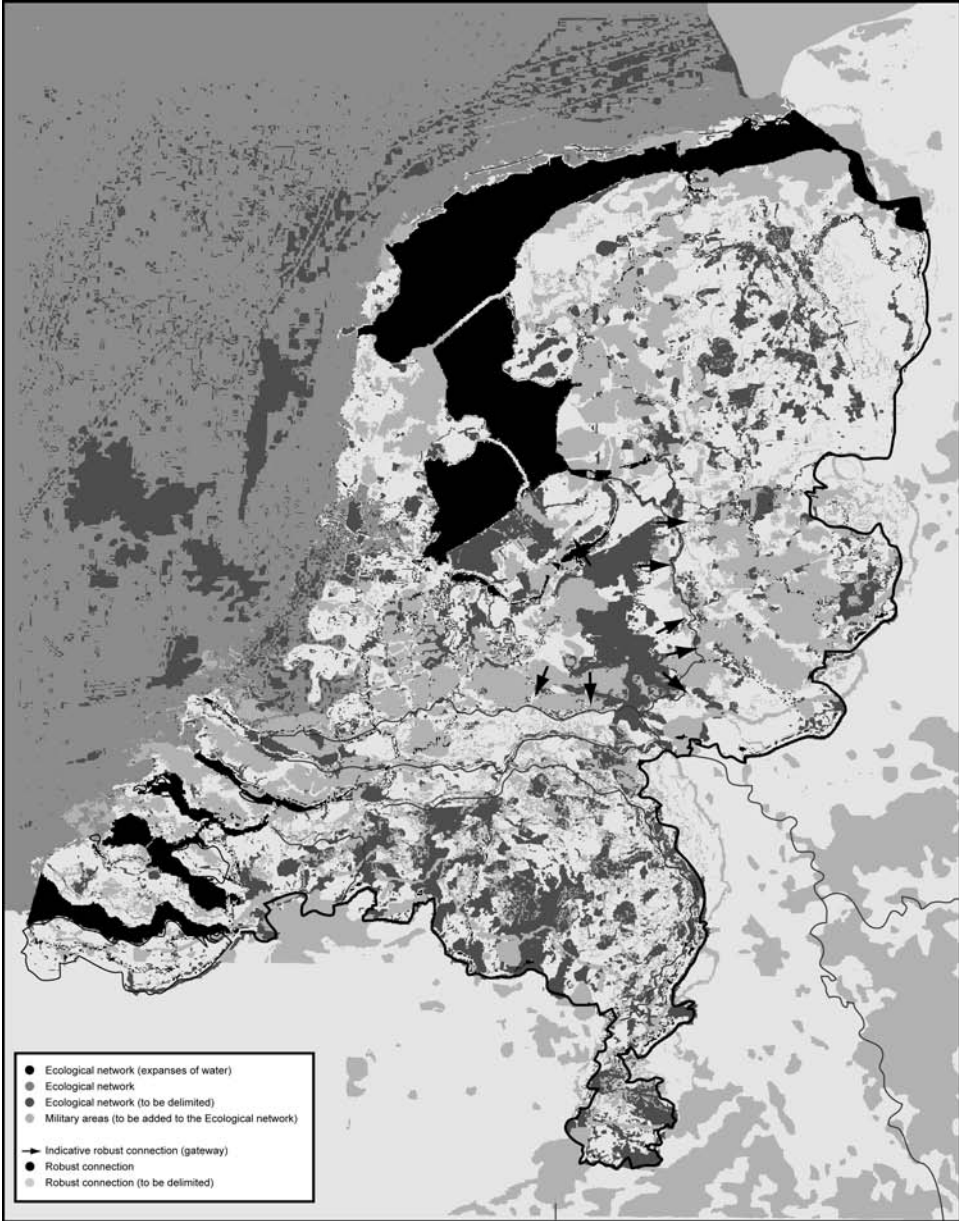


Figure 32.3 The Dutch EHS (after Ministry of Agriculture, Nature and Food Quality, 2004)

the Biesbosch National Park, and along the Waal, Maas, and Lower Rhine rivers where previously agricultural land is being returned to a natural state by a combination of hands-off management, promotion of natural processes and introduced grazers. The intent of the Dutch nature planners is to create a highly connected network to join up with similar networks in neighbouring Belgium and Germany (see Figure 32.3). This is the Ecologische Hoofdstructuur (EHS or National Ecological Network), and is itself intended to link to the

wider Pan European Ecological Network (PEEN) via core ecological areas, ecological development areas, preservation areas, and buffer zones with strategic ecological connections (Carver, 2006).

### A wilder landscape in the making?

The UK, like the Netherlands, is a relatively small country with a large urban population. Despite these similarities, the UK is somewhat behind its European neighbours in developing a more joined up and integrated thinking on rewilding and nature connectivity. There are perhaps useful lessons to be learnt from the Dutch EHS that could be applied to the UK. Better linking up of existing designated areas within the UK with new network of rewilded cores and corridors could be a good starting point. Efforts could be made towards mapping the linkages between our natural areas, improving those that already exist (whether notionally or on paper) and identifying gaps and the opportunities for bridging these. Many of the UK's protected areas show the makings of good connectivity, whereas others do not, such as the 'Black Hole' of the Midlands area. There are in fact more than 40 individual rewilding projects across the UK (Ward et al., 2006) although some prefer to use the term 'habitat restoration' for what they are trying to achieve. These span the length and breadth of the country from JMT's Sandwood Estate in the north to the work of Moor Trees on Dartmoor in the south-west and the coastal realignment scheme in the east at Wallasea, Essex, to the National Trust's Marloes Coastal heath land restoration, Pembrokeshire, in the west. A small selection are described here as good exemplars.

Wild Ennerdale is an example of upland rewilding on a 4,300 ha valley site located in the north-west of the Lake District National Park, Cumbria. It is a partnership between the National Trust, Forestry Commission and United Utilities with a vision to 'allow the evolution of Ennerdale as a wild valley for the benefit of people relying more on natural processes to shape its landscape and ecology'. The valley is unique in the Lake District in having no public through road and was heavily forested by sitka spruce and other non-native species in the 1940s. The partnership sees wilding as a process of change that involves reducing the intensity and type of human intervention and allowing natural processes greater freedom to operate (Browning and Yanik, 2006). Wild Ennerdale is not trying to recreate some past state but allow the valley to develop into the future over an open-ended time period. A suite of management actions are in place. These include:

- allowing areas where conifer has been clear felled to regenerate naturally with no specific preference towards what habitat develops;
- controlling spruce regeneration by planting juniper and native broadleaves to provide an alternate seed source;
- allowing natural regeneration of all species, reducing sheep grazing and replacing this with extensive cattle grazing by semi-domestic Galloways;
- removing physical and administrative boundaries;
- restricting vehicle access;
- removing/reducing modern human artefacts such as bridges and concrete revetments; and
- exploring the social aspects of how people are involved in landscapes.

Extensive monitoring at all landscape levels is an important part of the project and an extensive survey of the valley has been completed mapping over 80 separate national vegetation habitats, including nationally important mires, upland oak woodland and sub-alpine heath. The

River Liza is considered to be one of the top three geomorphologically most natural river systems in England.

Trees for Life is an organisation dedicated to restoring the Caledonian Forest to a target area of 150,000 ha in the Scottish Highlands working in partnership with the Forestry Commission, RSPB and private landowners. Trees for Life recently purchased the 4,000 acre Dundreggan Estate. Their vision is to restore a wild forest, which is there for its own sake, as a home for wildlife and to fulfil the ecological functions necessary for the wellbeing of the land itself focusing on a target area of 230,000 ha centred on Glen Affric, Glen Cannich and Glen Strathfarrar west of Inverness. Much of the old Caledonian forest has been felled for fuel and building material since Neolithic times and only a few tiny remnants remain scattered across the Highlands. A major restriction to regeneration is over grazing by red deer. The first stage of the project has been to fence out deer to allow existing trees and seeds to grow and reach maturity. The second stage is to assist natural regeneration by planting thousands of native tree seedlings (especially pioneer species such as birch, rowan and aspen) sourced from local seed, with the final third stage of removing non-native trees (Watson-Featherstone, 2004). Trees for Life have now planted nearly 1 million trees and set up enclosures across the target area with remarkable results.

A good example of lowland restoration more akin to the example of the Dutch EHS, albeit on a much smaller scale, can be found in the National Trust's 550 ha nature reserve at Wicken Fen near Cambridge. Restoration of the fen wetland is underway utilising careful rewetting and naturalistic grazing 'to secure the future of Cambridgeshire's fenland wildlife and to re-establish lost species'. The site was originally drained for agriculture in the sixteenth and seventeenth centuries by Dutch engineers but still retains odd fragments of old fen (alder carr, sedge and reed swamp) and wildlife-rich habitat. The project has been expanded into a vision for a landscape-scale nature reserve for the benefit of people and wildlife across 5,300 ha of land between the Wicken Fen nature reserve and Cambridge and so is thinking big and trying to deliver nature conservation on a large scale beyond the existing site (Warrington et al., 2009).

A final example is Abbots Hall Farm on the Blackwater Estuary along the Essex coast. This arable farm was purchased by Essex Wildlife Trust in 2000 and the protective seawall breached in five places to create an area of new salt marshes, coastal grazing, reed beds and saline lagoons with the remainder of the farm devoted to sustainable agriculture methods and habitat improvement. This is an example of coastal realignment with wide-ranging benefits for flood alleviation, water quality, wildlife, recreation, tourism and fisheries. Seawalls are costly to maintain and salt marsh is a rare habitat and getting rarer as they are eroded by sea level rise and squeezed between the sea and artificial seawalls. Coastal realignment is a rewilding approach that creates both habitat and provides sustainable coastal defences (May et al., 2007).

Although the UK conservation industry has already started to experiment with rewilding as a conservation strategy, a wider overview of the functionality of the natural areas in England, their connectivity and resilience has recently begun with the publication of the Lawton Report 'Making Space for Nature' and the subsequent government natural environment white paper 'The Natural Choice: securing the value of nature'. Significantly, the Lawton Report recommends that planning policy should plan for biodiversity at a landscape-scale and identify and map components of ecological networks. In line with EU targets, the report suggests that planning should promote the preservation, restoration and re-creation of priority habitats, ecological networks and the recovery of priority species populations. This all sounds pretty much like rewilding and indeed the report makes reference to the concept, along with species re-introductions, and recommends the setting up of a network of Ecological Restoration Zones (ERZs) that operate over large, discrete areas within which significant enhancements of

ecological networks are achieved, by enhancing existing wildlife sites, improving ecological connections and restoring ecological processes. Of course, the ecosystem services argument provides the underpinning rationale of ‘what’s in it for us?’

The UK government’s response was published in June 2011 and took on board some of the recommendations for new ERZs but changing the name to Nature Improvement Areas (NIAs). A competition has been launched to identify sites for twelve new NIAs that will contain all the components that Lawton set out for an ecological network that fit around existing wildlife sites using the cores and corridors model shown in Figure 32.2, and which should aim to achieve significant and demonstrable enhancements of the ecological network over large areas by improving the management of existing wildlife sites, increasing the size and number of wildlife sites, improving connectivity between sites and creating wildlife corridors. With only £7.5 million of funding expected to deliver twelve new NIAs over a four-year period it remains to be seen what will come to pass. Nevertheless, these are all steps in the right direction and we should see the development of a wider rewilding policy across the country over the next few years.

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